

China's Oil Supply Security: Imports, Strategic Stockpiling and Overseas Investment

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An Outline

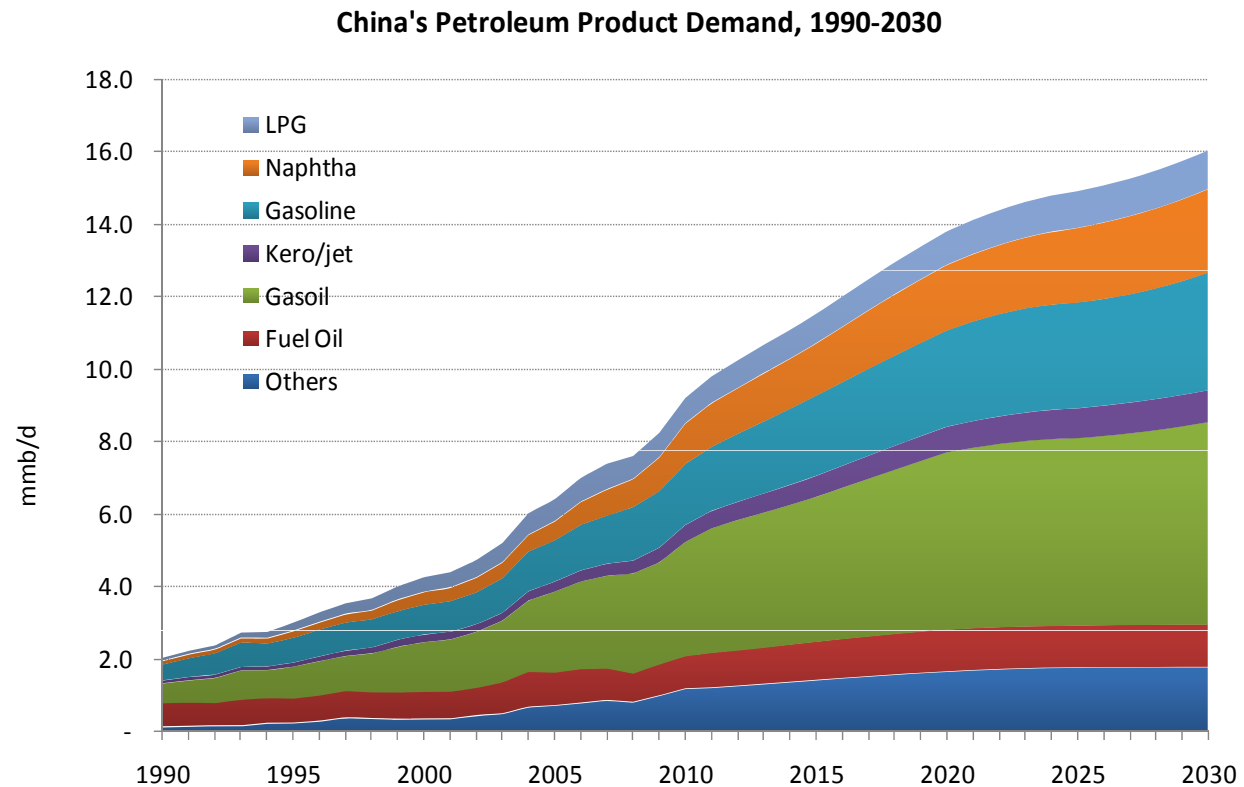
- China's Energy Vulnerabilities
- Oil consumption growth
- China's Rising oil imports
- The Refining Sector: Growth under the 12th FYP
- Elements of Energy Security
- Strategic Petroleum Reserves
- China's Overseas Investment
- Concluding Remarks

China's Energy Vulnerabilities

- Structural mismatch between energy consumption and production
- Rising energy imports
- Energy security
- Energy use and the environment
- Energy efficiency and conservation
- Regulatory issues
- Price reforms
- Weak energy supply system in rural areas

Oil Consumption Growth

- Between 1991 and 2011, the average annual growth rate (AAGR) of China's petroleum product (including end use of crude oil) consumption was 7.4%, one of the fastest in the world. The consumption went up from 2.3 mmb/d to 9.7 mmb/d.
- The future of China's oil demand growth is still robust. However, a big uncertainty is expected to emerge after 2020 when demand growth may slow down.



Note: 2011 data are estimates and 2012-2030 data are projections.

Long-Term Drivers of China's Oil Demand

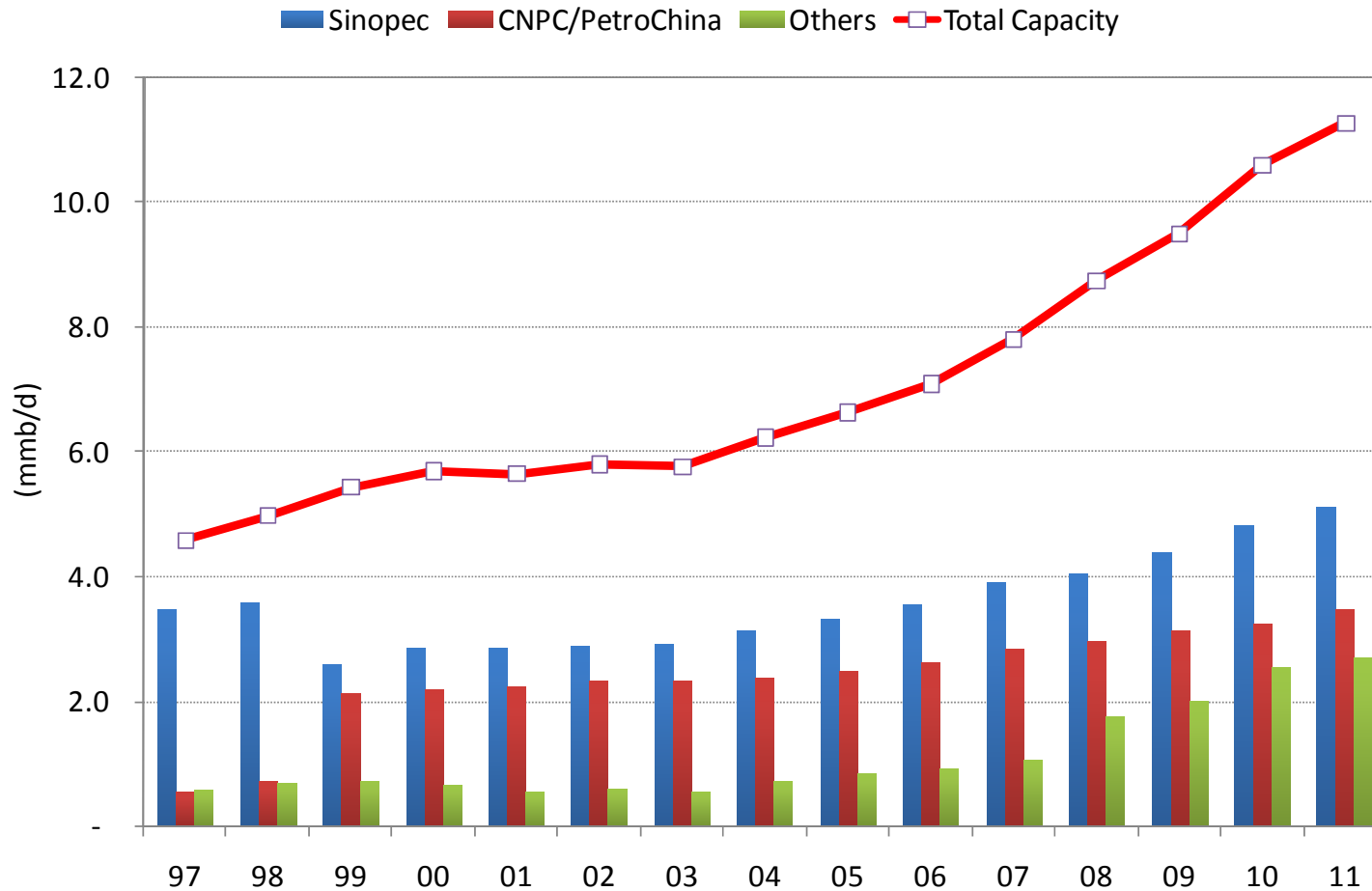
Key Drivers of China's Long-Term Oil Demand Growth

- Economic growth: 9.2% for 2011 and 8.5% for 2012. However, the Chinese government has set a moderate 7% as the AAGR of GDP for 2011-2015.
- Transportation sector—gasoline, diesel, and jet fuel
- Petrochemical sector—naphtha , LPG (possible), and other petroleum product feedstock
- Residential/commercial sector—LPG (with continuous impact from LNG)
- Industrial sector—diesel, fuel oil, petroleum coke, and others
- Agricultural sector—diesel and other products
- Foreign trade—bunker fuel (fuel oil)
- Construction and other sectors—asphalt, lubricants, wax, and other specialized products

Refining Capacity Changes

- Between 1997 and 2011, China's CDU capacity increased by 150%.

China's Start of the Year CDU Capacity, 1997-2011



The 12th FYP for the Refining Sector

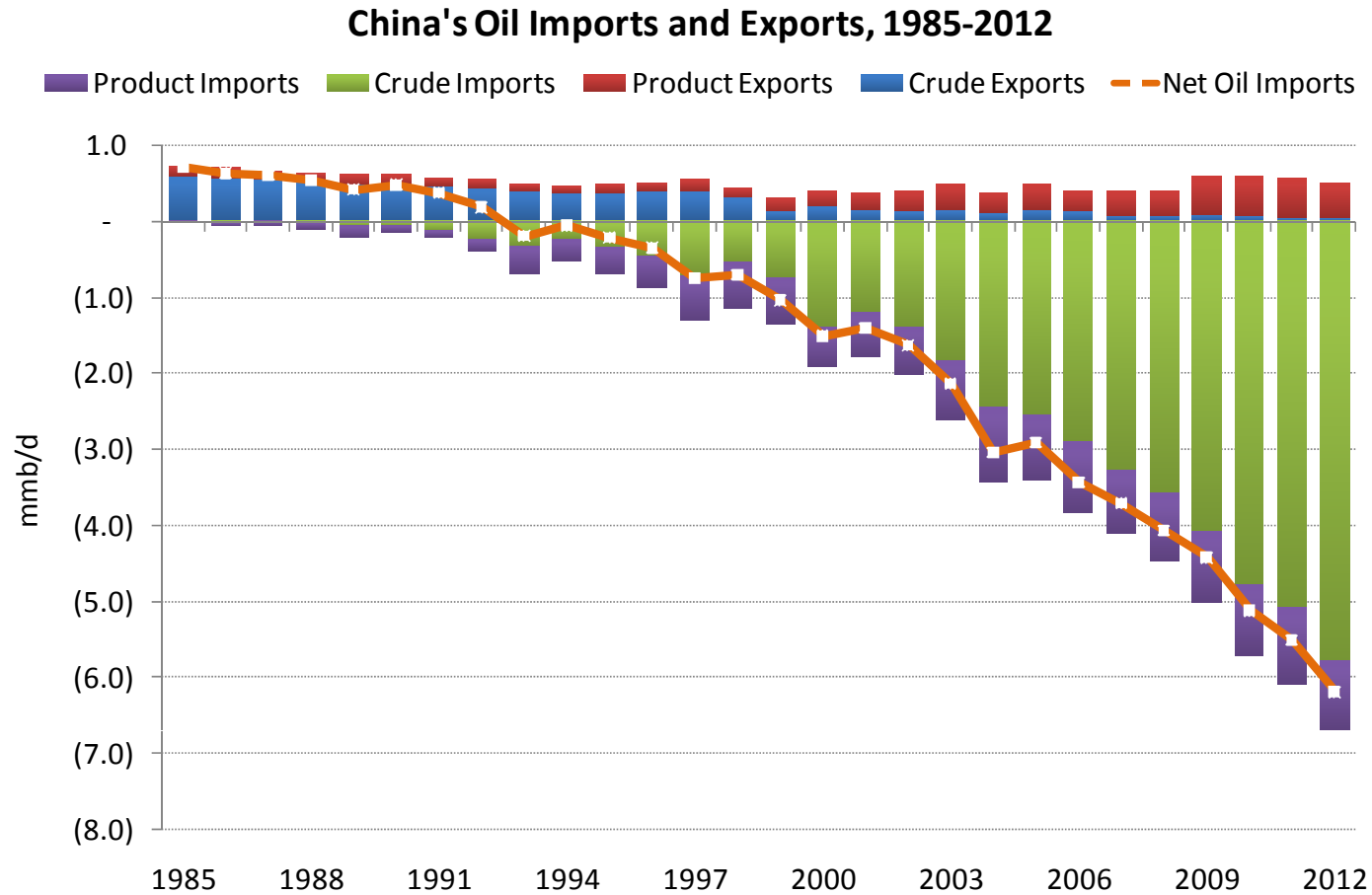
- Selected targets for the refining sector by 2015 under the 12th FYP (2011-2015):
 - Maintain an AAGR of 13% for the entire petrochemical and chemical sector.
 - Raise the total refining capacity to 12 mmb/d (600 mmt/y); ethylene capacity to 27 mmt/y.
 - Raise the average size of refineries to 120 kb/d (6 mmt/y) and average ethylene capacity to 700 kt/y.
 - Form three mega refining and petrochemical centers: Yangtze Delta, Pearl River Delta, and Greater Bohai Bay Area; Establish three or four bases each with 400 kb/d of refining capacity and 2 million t/y ethylene capacity.
 - Reduce CO₂ intensity by 17%, this is in line with the national target.

Future Refining Expansions

- China's refining capacity is continuously expanding.
 - Between the start of 2011 and the end of 2020, about 5 mmb/d of net new refining capacity is expected to be added under firm and likely plans.
 - Moreover, around 3.6 mmb/d of additional capacity is proposed by various players, but their status is uncertain at this point in time.
 - By 2015, China's capacity for handling sour crudes is expected to increase to 5.4 mmb/d.
 - Indeed, China may overbuild. All depends on how fast the petroleum product demand growth is for the country.

Largest Oil Importer in Asia

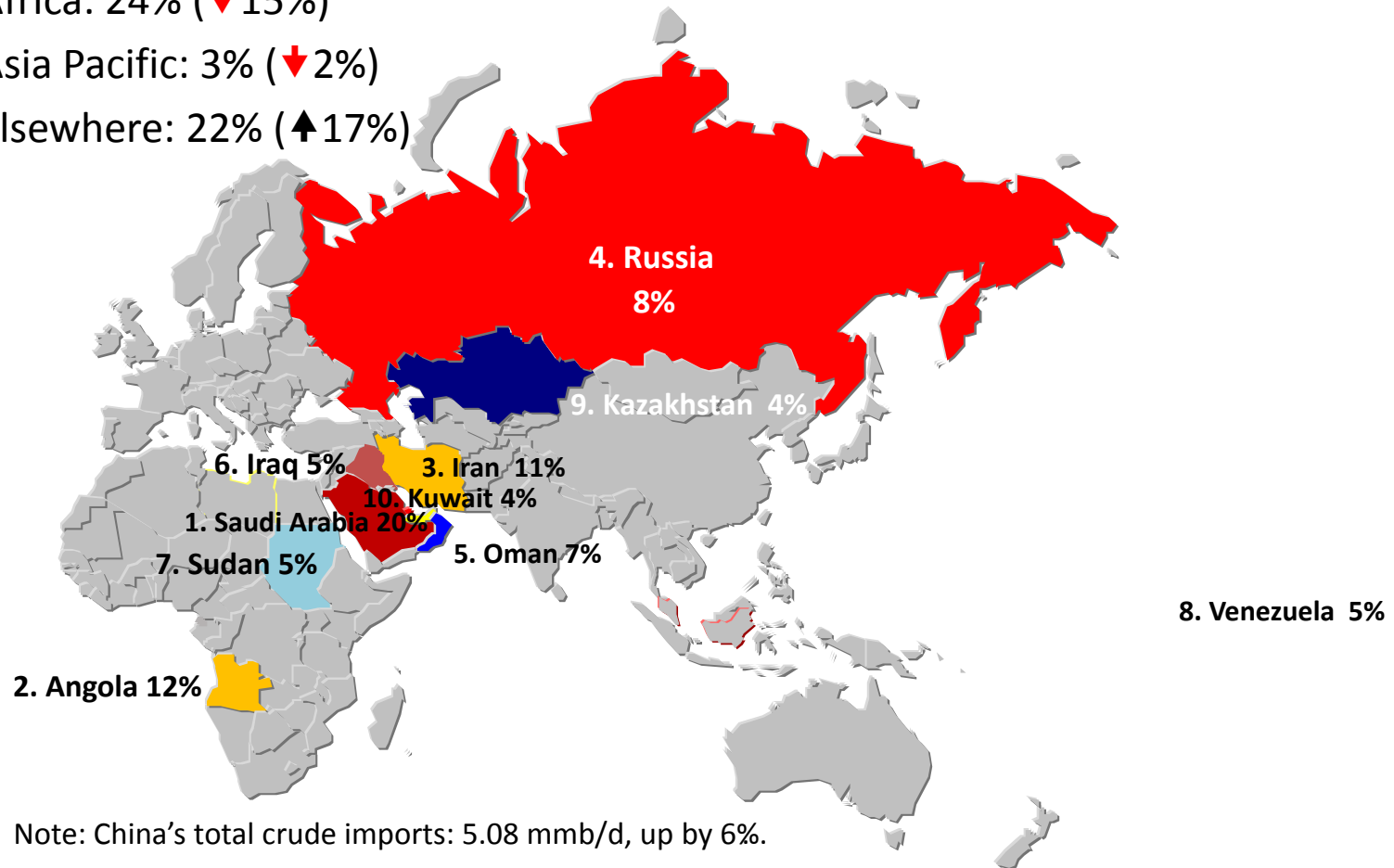
- China went from being the largest oil exporter in Asia in the mid-1980s to the largest importer now.



Note: 2012 data are projections.

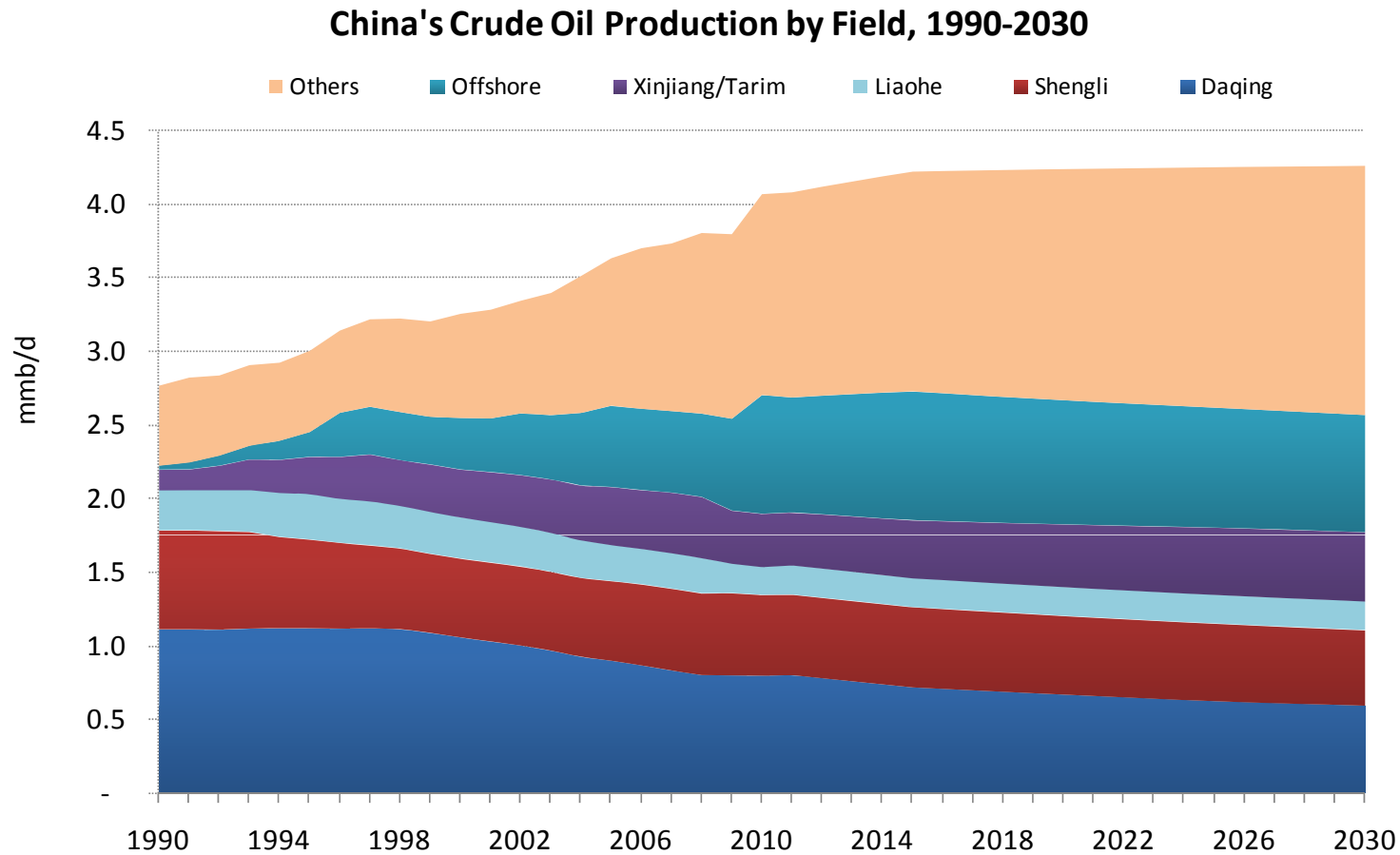
China's Crude Imports, 2011

- During 2011:
 - Middle East: 51% (▲15%)
 - Africa: 24% (▼15%)
 - Asia Pacific: 3% (▼2%)
 - Elsewhere: 22% (▲17%)



Stagnation of China's Crude Oil Production Growth

- China's crude oil production may reach its plateau by 2020.

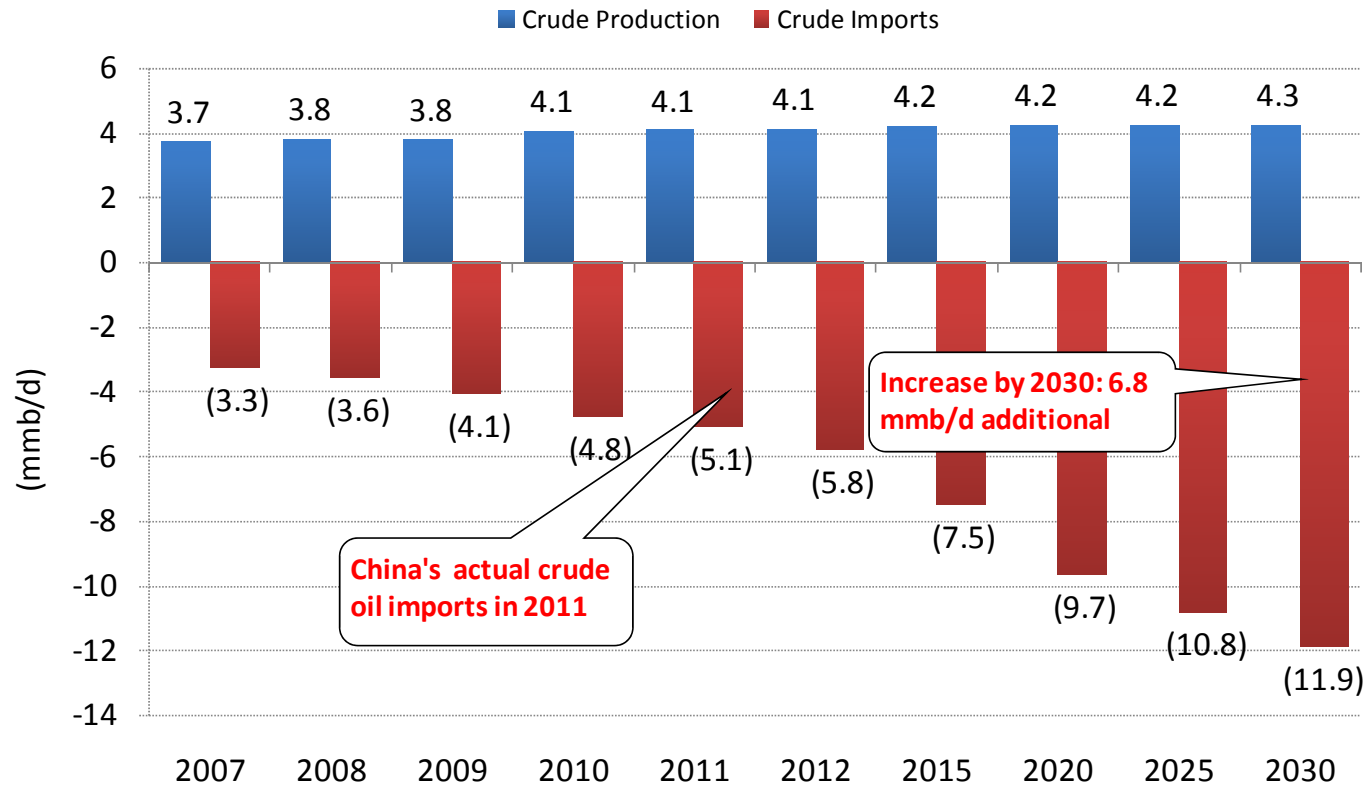


Note: Data for 2012-2030 are base-case projections.

Crude Balance Outlook

- But net imports of crude oil are going up fast.

Outlook for China's Crude Output and Imports



Note: 2012-2030 data are projections.

Energy Security for China

Main elements of China's energy security policy:

- Enhance domestic oil and gas E&P activities and maximize oil and gas production;
- Increase investments in oil and gas infrastructures and open more channels to imports;
- Diversify the sources of oil and gas imports, increasing the share of oil and gas imports from Russia, Central Asia, and Latin America;
- Establish strategic petroleum reserves;
- Strengthen the overseas investments by state oil companies;
- Establish a system for comprehensive energy security.

SPRs in China

- China's SPRs program is mainly to reduce the impact of crude supply disruption.
- Phase I (by end 2008): 16.4 million m³ or 103 million barrels (approximately 18 days of net imports or 10 days of total consumption as of 2011) in four sites (Zhenhai, Zhoushan, Huangdao, and Dalian). Phase I construction was completed and all the tanks were filled by April 2009, with average crude procurement price at US\$58/b.
- Target for Phase II (by 2012/13): Another 26.8 million m³ or 169 million barrels, totaling 272 million barrels (approximately 44 days of net imports or 28 days of total consumption).
- Target for Phase III (by 2015/2016): To establish 500 million barrels of SPRs (approximately 67 days of net imports or 44 days of total consumption).
- By 2020, to reach 90 days of net imports, China needs nearly 870 million barrels of SPRs, far exceeding the current levels of over 700 million barrels held by the US.

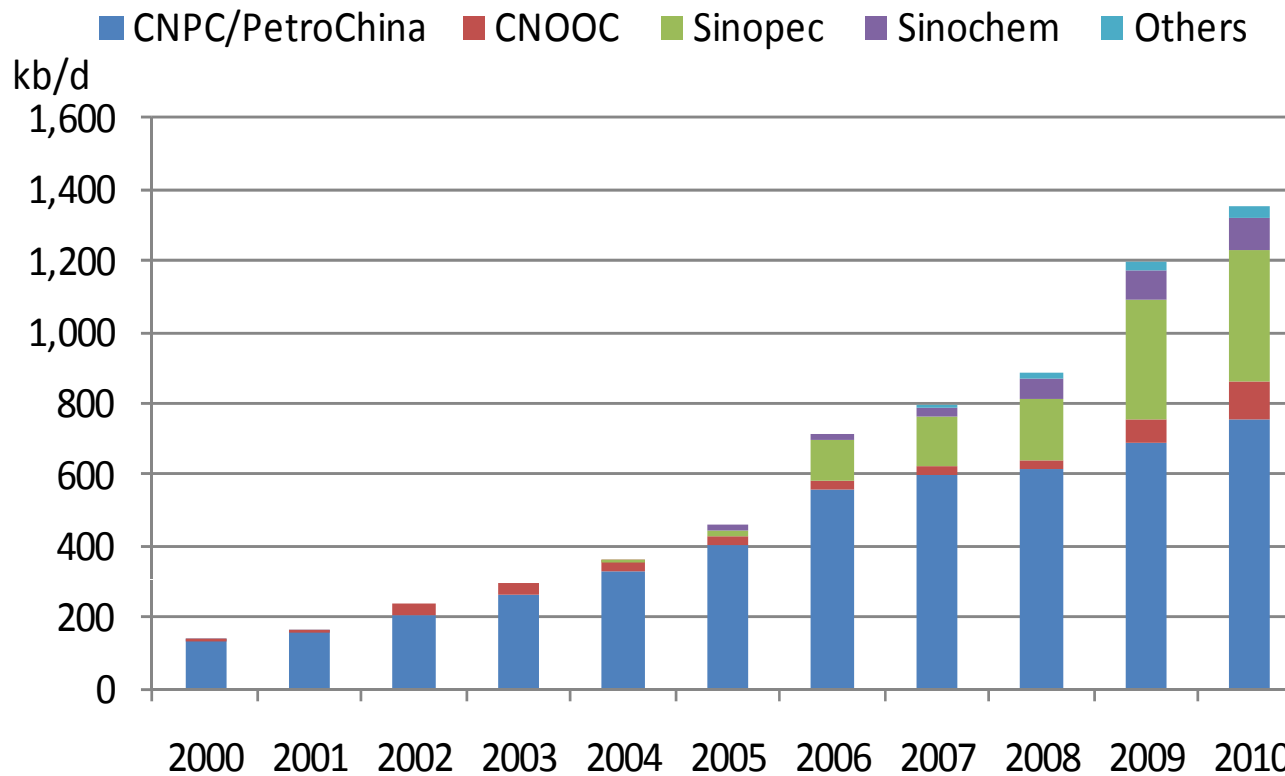
SPRs in China (cont'd)

- The National Petroleum Reserves Center (NPRC), established in December 2007, is in charge of China's SPRs but the sites are managed by state oil companies. The NPRC is supervised by the National Energy Administration.
- Commercial operations and management of the storages may be allowed to a certain degree, while the government retains overall control.
- The government is passing laws to require oil companies to establish a minimum level of storage as a supplement to the national storage.
- Overall, the government could divide China's SPRs into three categories: a truly national SPRs, commercial petroleum storage by state oil companies, and commercial storage by local government or private companies.

Overseas Oil Investment

- In 2010, total overseas equity oil output was around 1.3 mmb/d, up from 140 kb/d in 2000. In 2011, the equity oil production is estimated have reached 1.7 mmb/d.

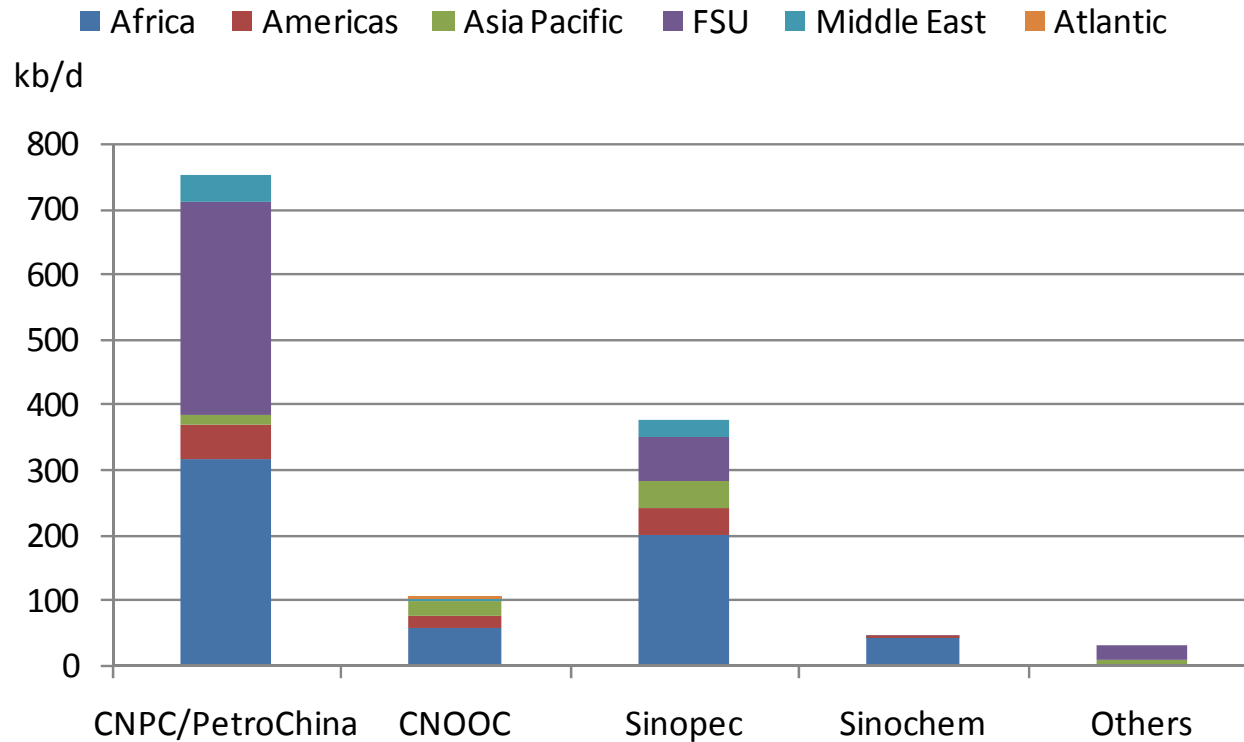
China's Overseas Oil Equity Production, 2000-2010



Overseas Oil Equity Oil Output by Region

- Current equity production is mainly in Africa (49%) and FSU (32%, mainly from Kazakhstan).

China's Overseas Oil Equity Production by Companies in 2010



Motivations for Overseas Investments

- Motivations for overseas investments:
 - Take advantage of the Chinese government's concerns over the security of energy supply
 - Expand as much as possible
 - Realize their individual globalization strategies
 - Make full use of China's own technological capabilities and labor force
 - Seek new technologies abroad such as hydraulic fracturing (fracking) and horizontal drilling technologies for shale gas development as well as deepwater drilling in offshore fields
 - Seek international profits

Methods of China's Overseas Investments

- Direct assets acquisitions :
 - Oil sands projects.
 - Many others (Chesapeake's shale gas assets by CNOOC, Arrow Energy with Shell by PetroChina, SPC in Singapore by PetroChina, Addax Petroleum by Sinopec, etc.).
- Partnered with IOCs to win service contracts to develop fields in Iraq:
 - Rumaila oil field (CNPC – 37%, BP – 38%, and Iraqi South Oil Co – 25%).
 - Halfaya project (CNPC – 37.5%, Total – 18.75%, Petronas – 18.75%, and Iraqi South Oil Co – 25%).
 - Missan fields (CNOOC – 63.75%, TPAO – 11.25%, and Iraqi Drilling Company – 25%).
- Heavily involved in the Iranian oil and gas business as IOCs pull out of the country due to US' sanctions.
- Offered a total of US\$90 billion in loans to oil and gas producing countries in exchange of long-term oil and gas supply contracts or upstream assets.
- International pipeline investments :
 - China – Kazakhstan crude pipeline (200 kb/d to 400 kb/d by 2013).
 - China – Russia crude pipeline (300 kb/d beginning 2011).
 - China – Myanmar crude pipeline (440 kb/d, later than 2014).

Selected Sources of Data

- *BP Statistical Review of World Energy 2011*, June 2011.
- IEA (International Energy Agency), *Oil Market Report: A Monthly Oil and Stocks Assessment*, various issues, Paris, France
- FACTS Global Energy (FGE) Database, 2012
- Chinese General Administration of Customs
- China National Bureau of Statistics
- Various online sources
- Platt's Price Database
- Author's own research

Concluding Remarks

- China's energy system has many vulnerabilities.
- Oil consumption in China continues to grow even from a large base already. Key drivers are the GDP growth and sector-specific needs.
- Almost every barrel of additional demand is translated into oil imports, led by crude oil rather than refined products.
- While the prospects for domestic oil production are limited, China has constantly expanded its refining sector and will continue to do so for next ten years and beyond.
- Energy Security is an emerging concern and China has adopted many elements.
- SPRs is a key element for China's energy security.
- China's overseas investment is massive, growing fast, and goes beyond the traditional scope of energy security.

Thank You for Your Attention!